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## MONOGRAPHIC STUDIES ON THE CHARACEAE. I. EMENDATION OF *NITELLA MORONGII*

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(Plate 1119)

T. F. ALLEN (Bull. Torrey Bot. Cl. **14**: 214. 1887) described a new species of Characeae, *Nitella Morongii* Allen, based on a collection cited as “. . . gathered by the Rev. Thos. Morong, on the Island of Nantucket, in a very muddy pool, July 21st, 1887.” He later (The Characeae of America, part **2**, fasc. 2: pl. 16. 1894. New York) illustrated the new species. Since Allen's death in 1902, this species has caused certain taxonomic difficulties. Through the cooperation of M. S. Doty, the writer has had the opportunity to study a series of specimens from the Woods Hole region, and feels obligated to attempt to clarify the apparent facts about the species and summarize the information.

The collection made by Rev. Thomas Morong includes a series of possibly fifty specimens. This series is quite consistent, and duplicates which have been issued to various herbaria (including MISS, MIN, UC, FH)<sup>1</sup> are very good. The majority of specimens are fertile and mature, and exhibit about the same gross appearance. Among the specimens seen by the writer, none has been specified as the type. Further, the writer has been unable to discover the specimen from which the published drawing was

<sup>1</sup> Abbreviations of herbarium names follow Lanjouw, Chron. Bot. **5**: 142-50. 1939, with the exceptions of the private herbaria of W. R. Taylor (WRT), M. S. Doty (MSD), E. T. Moul (ETM), the writer's herbarium (RDW), and the herbarium of the Marine Biological Laboratory, Woods Hole, Mass. (MBL).

made; but a photograph of *N. Morongii* apparently by T. F. Allen is extant in the herbarium of the New York Botanical Garden, accompanied by its original specimen. For this reason, the writer has selected this specimen as the type, and has designated the specimen as follows: "TYPE (lectotype), *Thomas Morong* no. 4, July 21, 1887. In a very muddy pool on the roadside, near Siasconset, Nantucket" (NY) (FIG. 1).

During July, 1947, the writer visited Nantucket, and sought the type locality of this species. Opposite Bloomingdale on the Siasconset Road are no small pools. On this, the east side, was a small *Sphagnum* bog completely covered by a mat; and somewhat farther south was an extensive *Typha* swamp. On the west side of the road was a cattle hole. None of these fit the description of the type locality, and it is concluded that the original pool no longer exists. A thorough search of the existing possible sites turned up no Characeae. Miss Grace Wyatt of the Maria Mitchell Association of Nantucket graciously guided the writer to other likely stations, but without success. No specimens comparable to Morong's plant have been reported since 1887, as far as is known to the writer.

A letter from Morong to Allen concerning his collection is extant in the herbarium of the New York Botanical Garden. The information is as amusing as it is pertinent: "No. 4. The nearest I can come to this is *Nitella gracilis*, possibly the large, diffuse form which Halstead [Halsted] says on authority of Farlow grows in Nobska Pond, at Woods Holl; but is it not extraordinarily heavy and stout for *N. gracilis*? If it were not of this order, no one would think of putting such forms together, but you do strange things with *Chara*— as for instance *C. intermedia* and *C. intermedia* var. *americana* are about as much alike in size as a walnut and a morning glory . . ." Halsted (Proc. Bost. Soc. Nat. Hist. **20**: 176. 1879) published the record of *N. gracilis* Ag. from Nobska Pond. Halsted's specimen is extant in the Farlow Herbarium. The "authority" mentioned was apparently W. A. Setchell or F. S. Collins; but in either case the specimens were distributed as *N. gracilis* f. *brachyphylla* under No. 1195 in the *Phycotheca Boreali-Americana*. The humor attests to slightly acid opinions by Allen's contemporary bot-

anists. Halsted's plants take on a greater significance as expanded later.

Prior to Morong's type collection, L. L. Dame had collected the same species in the same locality in 1886. The specimens are extant in the New York Botanical Garden, and have been distributed to other herbaria (including UC, F, FH, MISS). Concerning this collection, the label on the specimen (now in herb. NY) from F. S. Collins' herbarium is annotated: "This specimen apparently the first ever found of this species; it remained undetermined until 1887, when Mr. Morong found, at the same place, a *Nitella* which Dr. Allen named as above [*N. Morongii* Allen]." A comparison of Dame's and Morong's plants shows a decided difference in appearance, but almost complete identity of fundamental features. Dame's plants are densely bushy with well-formed heads about 5–10 mm. in diameter, and regular sterile branchlet whorls similar to *N. gracilis* (Sm.) Ag. On the other hand, Morong's plants have very small fertile heads 2–3 mm. in diameter, and very poorly developed sterile branchlet whorls. A possible explanation for this divergent expression might be suggested by his notes (in herb. NY) as follows: "The pool is one which does not dry up in the summer time, I am told; and is used by horses on the road as a drinking place. Hence, this little plant is constantly trampled by the feet of animals in the mire. It is a wonder how it lives with such usage, and in such dirty water." The present writer is of the opinion that a possible reason that this form has never again been collected is that Morong's plants exhibit a unique physiological expression which resulted from this peculiar combination of adverse circumstances impinging upon the plants in that pool at that season of that year.

A third type of plant which closely resembles Morong's collection is Halsted's *N. gracilis* mentioned above. As stated in Morong's letter to Allen, this plant is relatively large and quite diffuse. It also has characteristic condensed fertile heads and diffuse sterile whorls. Fundamentally, it differs from Dame's collection of 1886 only in being more diffuse. In all ascertainable respects, such as oospore membrane, oospore dimensions, furcation of branchlets, structure of dactyls and mucros, it is identical. Halsted's plant, then, is apparently a more diffuse ecological

expression of *N. Morongii*. This same form has been repeatedly collected at Woods Hole during the last fifty years, and is quite stable in its characteristics. It has been collected from Nobska Pond, Golf Pond, and Harper Pond, where it was found during the summer of 1947 by E. T. Moul (FIG. 2).

A fourth plant extant in the New York Botanical Garden is contained in the species-cover for *N. maxceana*. T. F. Allen had a difficult time indeed with this plant. It was at first identified as *N. batrachosperma* (Reich.) Braun, as indicated by written data on the herbarium sheet. It was reported as such by Maria Owen (Plants of Nantucket, p. 74. 1888. Northampton) as the first record of this species for America. Allen (The Characeae of America, part 2, fasc. 3: 27. 1896. New York) hesitatingly offered a tentative description of this plant under the name *N. maxceana* Allen, as possibly distinct from *N. minuta* Allen and *N. batrachosperma*. The name of his new species, with description accompanied by a specimen, was validly published, as recently pointed out by the present writer (Farlowia 3: 379. 1948). The only known existing specimen is hereby designated as the type and so indicated on the label accompanying the specimen: "TYPE: July 7, 1887, Morong. Maxey's Pond, Nantucket, Mass." (NY) (FIG. 3). On comparison with Halsted's plant or with the so-called *N. gracilis* of the Phycotheca Boreali-Americana, one finds *N. maxceana* Allen to be identical with the *N. gracilis* of Halsted and F. S. Collins.

A fifth plant extant in the New York Botanical Garden, where it had remained among the indeterminatae previous to the present study, is accompanied by the data: "Nitella, Woods Holl, Mass. 1883." This plant is almost a perfect intermediate between *N. maxceana* and *N. Morongii*, and helps close the gap between the two supposed species.

The conclusion which apparently must be made is that all the plants mentioned represent merely expressions of *N. Morongii*, and that the "typical" *N. Morongii* is in reality a very extreme abnormality; and *N. gracilis* according to Halsted and *N. maxceana* Allen are the normal form of the species. The description for this species thus requires emendation, and a revision is given below.

NITELLA MORONGII Allen, emended (FIG. 2). Plant monoe-

cious, up to 20 cm. high, delicate: branchlets of two types, including the normally expanded sterile or weakly fertile branchlets, and the greatly reduced sterile branchlets: sterile branchlets 2–5 (–8) in a whorl, 15–26 mm. long, 1–2 times furcate into 3–5 secondary rays, 2–3 tertiary rays: dactyls of sterile branchlets 2–3, 2-celled, the ultimate cell a conical mucro which is early deciduous: fertile branchlets 6–7 in a whorl, twice furcate, greatly reduced, 1–3 (–8) mm. long; 3–5 (–12) such reduced whorls borne on a reduced branch, the entire fertile complex resembling a dense head (or spike); heads appearing axillary in sterile whorls, or terminal, enveloped in weak mucus: dactyls of fertile branchlets 2 (–3), 2-celled, of which one is commonly shorter than the other, terminated by an elongated mucro: gametangia solitary, an oogonium and an antheridium at each fertile branchlet node: oogonia 290–386  $\mu$  long by 210–288  $\mu$  broad; coronula 35 x 35  $\mu$ ; oospores 238–268  $\mu$  long by 180–210  $\mu$  broad; striae of 5 prominent ridges; membrane roughened with anastomosing lines, almost appearing finely reticulate or grumous: antheridia 134–148  $\mu$  long by 174–179  $\mu$  broad, short-stipitate.—Bull. Torrey Bot. Cl. **14**: 214. 1887, descr.; *N. maxceana* Allen, Char. Amer., part **2**, fasc. 3: 27. 1896; *N. gracilis* (Sm.) Ag., accord. to Halsted, Proc. Bost. Soc. Nat. Hist. **20**: 176. 1879; *N. gracilis* f. *brachyphylla*, accord. to F. S. Collins, in Phyc. B.-A., fasc. xxiv, no. 1195; *N. batrachosperma* (Reich.) Braun, accord. to Allen in Maria Owen, Pl. Nantucket, p. 74. 1888.—MASSACHUSETTS: NANTUCKET CO.: Maxey's Pond, July 7, 1887, *T. Morong* (NY) (TYPE of *N. maxceana*, in New York Bot. Gard.); Siasconset, in a small pond on the south side of Sconset Road opposite "Bloomingtondale," July, 1886, *L. L. Dame* (NY, in one P. B.-A. packet, no. 1382); in a very muddy pool on the roadside near Siasconset, July 21, 1887, *T. Morong* (LECTOTYPE in New York Bot. Gard.); ibid., Aug. 23, 1896, *F. S. Collins* (P. B.-A., no. 1382, NY, BRU). DUKES CO.: Naushon Island, Petchett Pond, July 5, 1946, *Hannah Croasdale* (MBL). BARNSTABLE CO.: Golf Pond, July, 1931, *G. M. Gray* (WRT); July 6, 1917, *W. R. Taylor* (WRT); June 24, 1935, *Hannah Croasdale* (WRT); Harper Pond, July 7, 1947, *E. T. Moul*, no. 3173 (ETM, NY, RDW); July 11, 1947, *Urda K. Wood* (NY, RDW); Nobska Pond, July 15, 1894, *W. A. Setchell* and *W. J. V. Osterhout*, no. 644 (FH, MBL, NY, UC); July 15, 1894, *W. A. Setchell* (P. B.-A., no. 1195); Woods Hole, [locality not given] 1883, [coll.?] (NY); *Halsted* (FH) as *N. gracilis*.

Two markedly different forms are recognized as ecological variants: (1) compact form, with heads greatly reduced, 2–5 mm. in diameter, 5–12 fertile whorls on a fertile branch forming a spike-like head (July 21, 1887, *T. Morong* (NY)); and (2) diffuse

form, with heads 5–12 mm. in diameter, 2–4 fertile whorls on a fertile branch, forming a more or less spherical head (July 7, 1887, *T. Morong* (NY)).

Zaneveld (*Blumea* 4: 70. 1940) states that in his opinion *N. Morongii* Allen should be united with *N. translucens* Pers., but the present writer has been unable to discover much in common between the two species. A final decision on relationships must await further investigation.

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## SOME RESULTS OF A SUMMER'S BOTANIZING IN OKLAHOMA

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DURING June and July, 1947, the author participated in a project of the Oklahoma Biological Survey which included (1) a study of the floristic composition and ecology of relict Oklahoma grassland sites, and (2) a study of the flora and phytogeography of the state as a whole.

The part of the work first mentioned is being accomplished by studying grassland sites situated throughout the state. Areas were selected which will give a fairly accurate picture of the composition of, and seasonal succession on, the original prairies and plains of our state. In general two kinds of sites have been chosen: (1) meadows, consisting of unplowed prairies which have been saved for hay production, and (2) miscellaneous small areas which have escaped plowing or grazing due to their relative inaccessibility and size (such as small sites surrounded by rocky outcrops, or certain areas in railroad-right-of-ways). The former will not give an altogether true picture of the situation since mowing, too, is selective. It is thought, however, that study of relicts of all kinds will yield results of some value. They will be discussed in a later paper.

The present paper deals primarily with distributional notes concerning species rarely collected in the state, and species

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